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ANNOTATED LIST OF REPTILES TAKEN IN WESTERN BENGAL

By Warren P. Sights

This list does not pretend to be an exhaustive account of the species in this area since collection was done in the spare time allotted to the writer by the United States Army from March to October, 1945. The author wishes to express his appreciation to Lieut. Robert C. Gibbs and Sgt. Jay Jacobs for their aid in collection and preservation of specimens, and to the men of the 383rd Air Service Group for tolerating live cobras in their living quarters.

Alcoholic specimens of all reported species with the exception of Nos. 5 and 7 are held in the collection of the writer at Paducah, Ky. Number 5 was preserved as a skin; No. 7 lost in transit.

The area included in the report is the Midnapur District in western Bengal (approximate lat. 22 deg. N., long. 88 deg. E.) northward about 60 miles to Gharbetta, Bengal. Collecting was done at three main points: 1. Kharagpur, 2. Dudkhundi and 3. Gharbetta which will henceforth be designated as K, D and G respectively. The terrain is predominantly flat, covered with rice paddies and occasional waterholes which are surrounded by heavy vegetation in the form of bamboo thickets, low shrubs and tall trees. The ground in some areas is quite sandy while around the rice paddies it is clayey. Near Gharbetta is a relatively large tributary of the Ganges. Sixteen miles northwest of Kharagpur, near Dudkhundi, there are some low hills covered with open woodland with some rock outcroppings. The surrounding rice paddies are replaced by rather dense bush at a distance of about one mile from the base of the hills. Otherwise the topography is relatively constant. The streams and creeks are open and meandering.

All species are based on the scheme of Smith (1935, 1943) whose order is also followed.

Family *Gekkonidae*

1. *Hemiuactylus frenatus* (Schlegel). Very common K, D, in or about human habitation. Occasional specimens found under logs or rocks. Remained hidden most of the day and emerged at night at which time they emitted their queer laughing call. A clutch of seven eggs of this species was found in a hole in the wall of a deserted Indian hut near K on 5 August. The embryonic geckos were well-developed.

2. *Hemidactylus flaviviridis* (Ruppell). Rare, K, D. Single specimen captured in human habitation.

Family *Chamaeleonidae*

3. *Chamaeleon zeylonicus* (Laurenti). Common K, D and G. One specimen was found in middle of road; most in brush.

Family *Scincidae*

4. *Mabuya carinata* (Smith). Common K. Under logs, etc.

Family *Varanidae*

5. *Varanus flavescens* (Gray). Single specimen found K. Length, 737 mm., weight, 4 lbs., approx. Contained about 30 eggs when examined 4 July 1945. Ate well in captivity, feeding on toads.

Family *Typhlopidae*

6. *Typhlops braminus* (Russell). Uncommon K and D. One specimen dug up at K was robin's egg blue in color and of unusual diameter. It proved to be gravid and about to slough. If the overlying skin was peeled off, the true color was seen to be brown. The number of eggs was about seven when examined 14 June 1945. The eggs increased in development toward the vent; the size of the egg lying immediately anterior to the vent encased in its tough shell was 3.1 x 13.5 mm.

Family *Boidae*

7. *Python m. molurus* (Russell). Rare or absent K and D. Single specimen from G measured 1940 mm.

8. *Eryx j. johni* (Boulenger). Rare K. Single specimen dug from under bamboo thicket. This snake fed only on other snakes and once attacked a small Indian cobra. After the head of the cobra was forcibly removed from its mouth, the boa's head and neck became greatly swollen but reduced in the course of two days.

Family *Colubridae*

9. *Ptyas mucosus* (Gunther). Common K, D and G. Found everywhere, but primarily in or near bamboo thickets. These large snakes were often released in the straw roof of the writerJs quarters in an attempt to rid the straw of rats and mice. The efficacy of this method of vermin control is questionable, since none of the dhamans were subsequently captured for examination. Subjectively, however, the rat noises ceased for several days after release of the snakes.

10. *Oligodon taeniolatus* (Russell) Var.I (Smith). Not uncommon at K.

11. *Oligodon arnensis* (Russell). Uncommon at K and D.

12. *Ahaetulla tristis* (Russell). Common K and D. The temporals and upper labials vary in specimens from the same area. E.g., two specimens from K: (a) Temporals, 2-2-2; upper labials, 9/8. (b)Temporals,1/2-2-2; upper labials, 9.

13. *Chrysopelea ornata* (Russell) Var. II (Smith). Rare or absent K and D; rare G. The climbing ability of this species was well demonstrated by a single specimen in the writerJs possession. It had little trouble ascending a perpendicular, though rough, concrete wall, using slight irregularities and projections as "footholds" for its lateral keels.

14. *Natrix p. piscator* (Russell). Common at K, less so at D.

15. *Natrix stolata* (Cochran). Very abundant K, D and G. These snakes were often found about rice paddies but seldom submerged in water when alarmed as did *Natrix p. piscator*.

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16. *Atretium schistosum* (Russell). Rare K.

17. *Dryophis pulverulentus* (Boulenger). Rare D; rare or absent K. Single specimen was fed primarily upon geckos. Its strike was extremely deliberate, invariably catching the lizard by the neck. The strike was as accurate in dim light as in full daylight. After seizing its prey it worked immediately to get its fangs into play, leaving them imbedded until the struggles of the lizard ceased, after which ingestion began.

18. *Dryophis n. nasutus* (Andersson). Uncommon K, rare or absent D. Scalation of dermal appendage formed only of rostral, differing in this character from No. 17.

Family *Elapidae*

19. *Bungarus c. caeruleus* (Russell). Not uncommon K. The coloration seems to differ slightly from the *forma typica*. On one specimen from K: Scales in 15 rows as mid-body, vertebral spots present, transverse bars widened on sides of the body and pairing most marked on anterior portion. On another specimen from K: scales in 15 rows at mid-body, vertebral spots present on some bars, bars not widened on sides of body, pairing most marked posteriorly.

20. *Naja n. naja* (Russell). Not uncommon K, D and G. Found primarily between rice paddies and bush.

21. *Naja naja kaouthia* (Smith). More common than *N. n. naja*. One 250 mm. specimen would actively chase humans but was the only cobra observed which would. These snakes were often found out in rice paddies.

Family *Viperidae*

22. *vipera r. russelli* (Russell). Rare D; rare or absent K. Single specimen DOR, near D.

23. *Echis carinatus* (Russell). Rare K; rare or absent D. Several specimens DOR at K. The single living specimen examined from K whose total length was 257 mm. redefined vicious for the writer. As one approached the snake, it started striking at a distance of 20 feet, the energy and fury of which often hurled the little beast several inches along the ground.

Summary

Five saurian and eighteen ophidian forms are listed as occuring in western Bengal. Report of *Eryx j. johni* confirms Russell's earlier report of this reptile in Bengal (1801) and occurrence of *Dryophis pulverulentus* in this area constitutes an extension of range which Smith (1943) gives as "the western Ghats (Karwar, north Kanara, Nilgris, Castle Rock, Nellampatty Hills, Travancore); Ceylon". In the latter case it must be noted that American troops were traveling frequently from the established range to the area included in this report and the inclusion in their baggage of a slender form such as *Dryophis pulverulentus* seems highly probable. Confirmatory evidence is needed.

References

Russell, P. 1801, An Account of Indian Serpents, ii, London.

Smith, M. P. 1935, The Fauna of British India, Vol. II, Reptilia and Amphibia, London.

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Chicago, Ill.

CANNIBALISM AMONG *RANA PIPIENS BERLANDIERI*, AND POSSIBLY BY *RANA CATESBIANA*, NEAR SOMERSET, TEXAS--While watching several hundred young Meadow frogs, *Rana pipiens berlandieri* which were sitting on the muddy border of a small earthen tank, and which hopped about as I disturbed them, I noticed one with something protruding from its mouth, I chased it until it disgorged the object, which proved to be a smaller frog of the same species. The frog was nearly swallowed, the ends only of the hind legs were protruding, and it was mangled and dead. These frogs were all young of the year, and were about one and a half to two inches in length (body). This was July 17, 1947, and about three miles southwest of Somerset, Texas.

On June 18, 1947, I was told by two neighbor men that they had seen a young Bullfrog *Rana catesbiana* catch and eat a small frog which hopped near it, at the edge of a small earthen tank, while they were trying to catch some of them for fish bait. There were many young Bullfrogs at the tank, and probably the frog eaten was of the same species. A very few Meadow frogs *R. p. berlandieri*, and several Cricket frogs *Acris gryllus crepitans*, were seen and it is possible that it may have been one of them that was eaten, though most likely not. All of the Bullfrogs were young of the year.

These are the first instances of cannibalism by these two species that I have personally known of.--*Albert J. Kirn, Somerset, Texas.*

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HIBERNATION OF THE CALIFORNIA STRIPED RACER--*On November 26, 1947,* While digging in Alvarado Canyon, near San Diego State College, I found a California Striped Racer *Masticophis lateralis* hibernating.

The specimen was located about half way up the side of a steep slope on the shady side of the canyon in a topography characterized by chaparral type vegetation and large boulders of triassic felsite. The site itself consisted of a cavity about 12 inches below the surface of the ground, which was composed of loosely packed rocks and soil. The earth adjacent to the cavity was still cold and damp from a recent rain; the temperature was approximately 55 degrees Fahrenheit.

The snake, tightly coiled in the cavity, was very lethargic and made no attempt to escape. Even after being removed from the cavity it showed no inclination to move; but as soon as the warmth of my hands penetrated its body it began to liven up. Its tongue was slowly protruded and withdrawn at first, but in a very few minutes he flicked it in and out very speedily. After being slightly warmed its actions were quite normal.

Apparently it is not imperative that a snake go deep in order to hibernate in this semiarid climate. The thin covering of rocks and soil is probably enough to check the dangerously cold temperatures at or near canyon bottoms.

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FOOD OF THE WANDERING GARTER SNAKE, *THAMNOPHIS ELEGANS VAGRANS* (BAIRD & GIRARD), IN UTAH

By Wilmer W. Tanner

The wandering garter snake, *Thamnophis elegans vagrans* (Baird & Girard), is one of the commonest snakes throughout Utah. Recorded occurrence in the state range from 2800 feet near St. George, Washington County, to near or above 9000 feet at Bryce Canyon in Garfield County, Aquarius Plateau in Wayne County and Mt. Timpanogos in Utah County. This subspecies is most commonly found near streams, ponds, swamps, or other wet situations, and few have been seen more than half a mile from water, but occasional individuals may wander as much as a mile from water. Large populations have been observed where willows, or other shrubs form a series of thickets along stream banks. Probably the restriction of this snake to the vicinity of streams and moist areas during the greater part of the year involves a requirement of water. Other favorable conditions in such sites include the abundance and variety of food there, the lower and more uniform ground temperatures, higher humidity, shade from the heavy plant growth and thickets for hiding.

Fitch (California Fish and Game, 27. 2, pp, 10-11) summarized feeding records of this subspecies throughout its range, but without indicating precise localities. The following feeding records which are concentrated in a relatively small area of the entire range are significant in showing trends of local food preference. Free-living individuals were seen feeding just after sunrise and at other times as late as sundown. More instances of feeding were recorded for the afternoon than for either morning or evening. The snakes on which observations were made were all adults and were either in the process of feeding or had just completed the meal. Prey was indentified as follows, and unless otherwise indicated, was found in the digestive tract of the snake.

Fishes: *Salmo* sp.; August 1929, in a small tributary of Nebo Creek, Utah County. When first observed the snake was holding on to the caudal fin of a five-inch speckled trout and after a short struggle pulled the fish to the edge of the pool and swallowed it. *Salmo fairo;* June 28, 1945, Provo River, Provo, Utah County.

Richardsonius hydrophlox; June 1941, and June 28, 1945, Provo River, Provo, Utah County.

Apocope sp.; June 1, 1942, Provo River west of Provo, Utah County.

Students reported to me that they saw garter snakes feeding on minnows in the Provo River. From the descriptions given it appeared that most of the fish eaten were small Cyprinids; no trout were identified.

Amphibians: *Ambystoma tigrinum;* June 25, 1938, West Deer Lake, Aquarius Plateau, Garfield County. Found in two snakes.

Bufo; September 1939, Provo, Utah County. One small *B. woodhousii*.

July 1942, Indianola, Sanpete County (Tadpoles of *B. woodhousii* and/or *B. boreas;* adults of both species were seen in the area during the breeding season).

Rana pipiens; May 1937, June 1940, June 1941, July 1945, Provo, Utah County; August 29, 1941, Fairview, Sanpete County.

Rana pretiosa; September 2, 1941, Fairview, Sanpete County. Found in two snakes.

Pseudacris nigrita; June 25, 1938, Steep Creek and July 2, 1938, Posy Lake, Aquarius Plateau, Garfield County.

Reptiles: *Sceloporus graciosus;* August 1939, Provo Canyon, Utah County.

Eumeces skiltonianus; August 5, 1939, West Canyon, Utah County. Four recently hatched individuals were removed from the stomach of one snake.

Mammals: *Microtus* sp.; June 1938, provo, July 1939, August 1941, and August 1942, Nebo Creek, Utah County.

Peromyscus sp.: July 1939, June 1940 and August 1942, Nebo Creek and July 1944, Provo, Utah County; August 1941, Fairview, Sanpete County.

Insects: *Pardolophora* sp.; June 10, 1942, Indianola, Sanpete County. A specimen containing two adults of these large grasshoppers, and fragments of others partly digested, was caught along an irrigation canal.

A few individuals of this large species of *Pardolophora* would provide an average meal for this snake. Students have reported it to feed on earthworms and snails, but this is my first observation of an adult feeding on invertebrates. Fitch (1941) reported such items as slugs, earthworms, leeches and snails, but listed no arthropods. On page 21 (ibid) it is suggested that fragments found in garter snakes stomachs, represent the indigestible chitinous remains of insects eaten by small insectivorous vertebrates. Numerous caged specimens were offered insects, but only two are known to have eaten. In both instances the snakes were subadults and ate only nymphal grasshoppers.

Observations on caged wandering garter snakes showed them to be indiscriminate feeders when compared wit[1] other *Thamnophis* and particularly with *T. sirtalis parietalis*. Upon many occasions individuals have been observed to feed on fish *(Cyprinidae)*, frogs *(Rana)*, lizards *(Uta, Sceloporus, Gambelia, Cnemidophorus* and *Eumeces)*, mammals *(Microtus, Peromyscus* and *Mus)*, and grasshoppers. Caged individuals were not observed to eat other snakes. The principal limiting factor appears to be the size of the item. One caged individual ate at one feeding two adult leopard lizards, *Gambelia w. wislizenii*. The records of feeding were obtained both from snakes caged for several months and from those recently captured or while still in the collecting bag. Where the streams are small and the aquatic food limited, snakes feed on lizards and small mammals that may be found within foraging distance of the stream of springs. Consequently, the absence of this species from areas more than one mile from watercourses and that have populations of small lizards and mammals, is not to be explained on the basis of unsuitable food, but probably on the limiting factors of the physical environment.

In spite of *vagrans* increased terrestrial tendencies, it has not been able to live permanently far from watercourses, at least in the dry portions of its range. The practice of irrigation throughout the state has unquestionably made available large areas formerly uninhabited by this snake.

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ROAD COUNTS OF SNAKES IN WESTERN LOUISIANA

By Henry S. Fitch

During March, April, May and June, of 1948, while staying at Leesville in west central Louisiana, the writer kept road counts of snakes on frequent short automobile trips. The area involved was about 80 miles in maximum diameter, from Alexandria, on the east, at about the center of the state, westward to Newton and Hemphill along the eastern edge of Texas. Most frequently, travel was to the Red Dirt National Wildlife Refuge, about 30 miles air line NNE Leesville (26 trips) and to the Evangeline Division of the Kisatchie National Forest, about 36 miles air line directly east of Leesville (11 trips). For each locality the round trip by road averaged approximately 80 miles. Seventeen shorter trips were made, five west from Leesville toward or beyond the Sabine River, and others to the Vernon Division of the Kisatchie National Forest, SE from Leesville.

The total mileage for these trips was approximately 5300; 1426 in March, 2482 in April, 1292 in May and 100 in June. Twenty-two living snakes were seen, averaging only one to 240 miles of driving during the "snake season". Of the distance travelled, 1700 miles were on surfaced roads and the remainder, over 3600 miles, was on gravel and dirt roads, and firebreaks. Most driving was done before mid-morning, and from mid-afternoon to late evening, after dark, the times of day when greatest snake activity might be expected. Some of the driving was through stands of longleaf pine, mainly in dry sandy upland. At least half the distance travelled was through waste areas of former longleaf pine forests, clean-cut, and burned annually, till devoid of all trees, or supporting a scrubby growth of such species as blackjack oak, bluejack oak, and post oak. Part of the driving was through well watered bottomlands, with mixed pine and hardwood forest in dense stands, various oaks, loblolly pine, shortleaf pine, sweetgum, blackgum, white bay, southern magnolia, beech and bald cypress. Farmlands, with corn and other crops, adjoined the road for a small part of the distance driven.

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It is universally agreed by natives and longtime inhabitants of the general region that snakes are far less abundant now than in past decades of the present century. Deforestation of west-central Louisiana has occurred mostly since 1920. Removal of the longleaf pine woods, and frequent burning of the grasslands which replaced them have altered the original habitat in a way that is unfavorable for most wildlife species, including snakes. The gradual increase in the human population has resulted in increasing pressure on the native wildlife, so that most of the larger reptiles, birds, and mammals are nearly exterminated, or have become scarce and localized. The smaller forms have become correspondingly scarcer and increasingly localized. During the early part of the present decade the activating of army camps in Louisiana and the large scale army maneuvers led to concentrations of humans in places hitherto but thinly populated. Slaughter of snakes took place on a large scale, and may have effected drastic reductions in numbers of

some of the more conspicuous kinds, at least. Ever since this region was first settled, range hogs have roamed the woods and have been an important factor in their ecology. They are known to feed on snakes, including the venomous species.

Still another ecologic factor is the armadillo. Formerly confined to extreme southern Texas and regions to the southward, it has gradually extended its range northward and eastward during the past 80 years, and was first seen in western Louisiana in 1916 or 1917. Since then it has spread throughout the state, and at the present time is one of the most abundant and conspicuous forms of wildlife in the area where road counts were made. Arthropods make up most of the food but it is also known to feed upon reptiles. Several persons in Louisiana told the writer of seeing encounters between armadillos and snakes, in which the reptiles were killed and eaten. The contents of 104 armadillo stomachs collected within the area where snake counts were made, included only three small snakes (2 *Haldea striatula*, 1 unidentifiable) and one clutch of snake eggs, which were about 40 mm. long. Lizards and their eggs were eaten more frequently; there were 23 lizards (14 *Anolis carolinensis*, 7 *Leiolopisma laterale*, and one each of *Eumeces fasciatus* and *Cnemidophorus sexlineatus*) and 12 clutches of their eggs.

The counts of snakes seen on roads indicate, in a general way, their abundance, and also the relative abundance of the different species. But some kinds, of secretive habits, are not found on roads in proportion to their true abundance. Some of the more active kinds frequently escape being crushed by passing automobiles and are therefore less likely to be found DOR than are slow-moving species. Kinds that are small or dull colored, or both, are likely to escape notice, especially when crushed flat on the road surface.

Seventeen species, including the saurian "glass snake", were recorded in the counts. Of the total 92 recorded, 59, or 64 per cent, were on the surfaced roads, which made up only 47 per cent of the distance travelled. The greater area of road bed in view, and the large number of DOR snakes resulting from more traffic on paved roads are probably the factors contributing to this disparity in favor of the surfaced roads. Of the total 92 recorded, 66, or 72 per cent were DOR. Most of these probably had been dead for only a few hours. Carcasses of animals run over on roads are in most cases quickly removed and eaten by scavenging vultures, range hogs and armadillos.

In the following list, the kinds and numbers of snakes seen on roads, and the types of situations are recorded. Specimens were preserved (these now) in the University of Kansas Museum of Natural History. The habitat notes recorded do not pertain exclusively to the road counts, but are based also, in part, on extensive field work afoot.

Variegated racer *Coluber constrictor anthicus*, 17; all habitats, especially grassy uplands.

Eastern coachwhip *Masticophis f. flagellum*, 17; all habitats, especially dry uplands, often near cultivated areas.

Common hog-nosed snake *Heterodon p. platyrhinos*, 9; all habitats, especially dry, sandy uplands.

Speckled king snake *Lampropeltis getulus holbrooki*, 8; pine and oak woods.

Gray rat snake *Elaphe obsoleta confinis*, 7.

"Glass snake" *Ophisaurus ventralis*, 7; grassland where grass is thick and high, and not frequently burned, as where adjacent to brush or moist bottomlands.

Western ribbon snake *Thamnophis sirtalis proximus*, 6; either woods or grassland in vicinity of water—river, creek, and upland "branch".

Mississippi River water snake *Natrix sipedon confluens*, 3; one near river in wooded bottomland, 2 in dry upland woods.

Louisiana bull snake *Pituophis melanoleucus ruthveni*, 3; these and several others seen or reported were all in dry, sandy longleaf pine woods.

Texas coral snake *Micrurus fulvius tenere*, 2; one crossing road in swampy, wooded bottomland, one in open grassland of former pine woods.

Red-bellied water snake *Natrix e. erythrogaster*, 2; near streams.

Diamond backed water snake *Natrix rhombifera*, 2; near streams.

Striped water snake *Natrix rigida*, 2; one near stream, one in upland woods of sandjack oak.

Graham's water snake *Natrix grahami*, 1; near stream.

Keeled green snake *Opheodrys aestivus*, 1; former pine woods in area of scrubby blackjack oak.

Southern copperhead *Agkistrodon c. contortrix*, 1; wooded bottomland.

Yellow bellied king snake *Lampropeltis c. calligaster*, 1; mixed woods.

Unidentified, 3.

No less than 18 other species of snakes, which might be expected in this area on the basis of geographical probability, were missing from the records, but three of these were encountered in driving over the same area during the 1947 season: the western mud snake *Farancia abacura reinwardti*, the water moccasin *Agkistrodon piscivorus leucostoma*, and the western ground rattlesnake *Sistrurus miliarius streckeri*. The mud snake and moccasin were found in swampy areas. The moccasin was found to be abundant along some small woodland streams. The ground rattlesnake was found to be fairly common locally in thick mixed woods, and most of those found were out after warm summer rains. Two other species, DeKay's snake *Storeria dekayi* and the southern ground snake *Haldea striatula* were encountered during the course of field work but were not found on roads. The canebrake rattlesnake *Crotalus horridus atricaudatus* was not encountered, but several reports of its occurrence were received from the vicinity of the Red Dirt National Wildlife Refuge and from the Sabine River bottomlands. It is becoming increasingly rare, and persons who spend most of their time in the woods and swamps where it still occurs expect to see not more than one a year on the average. The remaining 12 species which might be expected to occur in the general region were neither seen nor heard of in the course of field work, These are: the western worm snake *Carphophis amoena vermis*, the Miss-

issippi ring-necked snake *Diadophis punctatus stictogenys*, indigo snake *Drymarchon corais couperi*, Emory's rat snake *Elaphe laeta*, corn snake *Elaphe guttata*, Cope's milk snake *Lampropeltis doliata amaura*, scarlet snake *Cemophora coccinea*, green water snake *Natrix cyclopion*, redbellies snake *Storeria occipitomaculata*, western ground snake *Haldea valeriae elegans*, lined snake *Tropidoclonion lineatum*, and slender tantilla *Tantilla* ***gracilis***.

The absence of small and secretive forms from the road counts is not surprising and during routine fieldwork the writer had little opportunity to search for them. The ring-necked snake, for instance, has been recorded from within this same area (Blanchard, Bull. Chicago Acad. Sci. 1942 :90.) The green water snake probably occurs in the area, but happened not to be encountered on the roads, and water snakes ordinarily were too wary to be approached closely for positive identification in the field. On the other hand, absence of records of the large and conspicuous indigo snake, and corn snake from the records may be interpreted to mean that they are rare or absent in this region.

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AN OVERWINTERING COLONY OF *COLUBER C. CONSTRICTOR* (SAY) AND *ELAPHE O. OBSOLETA* (SAY)—A collecting trip made to an old cistern near Columbia, Missouri on March 3, 1949 resulted in the taking of eight Blue Racers and seven Pilot Blacksnakes. The snakes were concentrated near the top of the cistern which was filled to within three feet of the top with water. Their position was under water in all instances at depths varying from two to six inches. Their tails were inserted deeply in the crevices of the rocks and the anterior part of their bodies floated in the water. The snakes were not trapped in the well; had they desired they could have escaped very readily, and they could have climbed higher to get out of the water. For this reason I believe the snakes had deliberately hibernated here and not accidently fallen in. At intervals the snakes allowed their heads to break the surface of the water for several minutes apparently filling their lungs with air, after a short period they would sink back below the surface of the water. The air temperature was between 55 and 60 degrees F. Neither the water temperature nor the time intervals between the apparent respiratory action was noted.

The snakes may have been disturbed and slipped into the water upon my approach, but this is unlikely judging from their lack of resistance to capture. They may have hibernated in the lower part of the cistern and been driven higher by the rising water. A native of the area told me that the well was usually dry and the water resulted from the melting ice and snow.—*Virgil Owens, Columbia, Mo.*

DISEASES OF *HELODERMA*--Persons who have kept Gila monsters attest to their hardihood. Many other reptile pets require much care, but not these lizards. One may go for weeks without feeding or watering them and they still remain alive. Not that this is recommended. Nevertheless, it does show their powers to withstand privations.

They are subject to illnesses, however. In captivity, both *Heloderma suspectum* and *H. horridum* have succumbed from starvation because of their refusal to take food. According to Landry, they have died from having lice, as well as from pneumonia. Grace Olive Wiley lost two *suspectums* and one *horridum* due to pneumonia contracted when wind blew through the screen-covered lids of their cages.

On the side of their ability to overcome disease is the statement by Rokosky that newly arrived specimens to the Chicago Zoological Park, suffering from sore mouths and canker, were treated by electricoagulation which cured the infection. Charles F. (Skip) Dailey informs me that for canker of the mouth in both his Gila monsters and snakes, he merely washes it with peroxide.

A too cold temperature has resulted in deaths. On the other hand, a too long exposure to the direct rays of the sun has termiated fatally. The pens should be provided with shade which the captives may have access to at will.

In an interview with Francis V. Earnest, Jr., owner of the California Alligator Farm, I learned that he lost seven *suspectums* and two *horridums* one after the other. He easily accounted for the demise of one. A baby alligator bit it on the stomach. As for the remainder, he is without an explanation. They had fed well, did not experience extreme heat or cold, and were not overlong in the sun. The day before each died, it was truculent and struck at the least provocation. Jack Mitchell of Littlefield, Arizona, a school teacher who runs a small roadside zoo for educational purposes, told me he also lost specimens without being able to determine the reason. These incidents furnish a problem for students of this genus.

Weldon D. Woodson, Los Angeles, Calif.

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SUMMARY OF *HELODERMA'S* FOOD HABITS--The composition of *Heloderma's* diet, like that of so many aspects associated with it, has been a subject of controversy. Actually, there have been only a few instances where persons have observed it eating in the wild. Neither has its stomach contents been recorded extensively.

Of forty-one sources--both popular and technical--that list its food requirements in the native state, only five or possibly six indicate that the report was based upon personal observations. Even so, due to the wide variation of the contents of the forty-one reports, it is interesting to summarize them.

A portion named only a single item; others gave up to five. Beginning with the most mentioned and working down, nineteen declared that it eats bird eggs, seventeen, lizard eggs, and twelve, snake eggs. One suggested that it is not loathe to partake of the eggs that it, itself, deposits. Thirteen asserted that it feeds upon insects, including grubs, crickets and ants. Fourteen cited as palatable small mammals, as young rabbits, mice, pack rats and ground squirrels. Nine mentioned other species of lizards; the same number, earthworms; six, toads; five, centipedes; and two, live snakes. One summed up its diet with the single statement that it subsists on carrion.

In captivity, *Heloderma's* food naturally consists of whatever it can be induced to consume. This has been standardized to the extent that reptile dealers in connection with their shipments send a sheet of instructions on what to feed them. Some nevertheless have enticed their captives to partake of foods which others have testified that theirs stubbornly refused. To the latter, the revelation of the exact items will be a decided surprise. The data comes from the literature, extensive correspondence and personal interviews.

All reports that both *H. suspectum* and *horridum* relish eggs of the common domestic fowl. Most break them for the lizard. A few, however, permit it to crack the egg. A still lesser number offer it crumbled pieces of hard-boiled eggs. Chopped meats mixed with the raw egg has been highly recommended. Other rations include milk, corn meal, cod liver oil, bone meal, dry bread and potato salad. In addition to this, turtle and other reptilian eggs, mice and small snakes have been fed it. None of these, however, has proven as beneficial as the raw eggs of the barnyard fowl.—*Weldon D. Woodson, Los Angeles, Calif.*

* * *

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AN ABERRANT PATTERN OF *AGKISTRODON MOKESON AUSTRINUS*

By Robert L. Livezey

It is interesting to note a specimen of *Agkistrodon mokeson austrinus* demonstrating an extremely variant condition. This specimen (fig.1) was taken by Mr. Tom G. Anders 2 miles south of Huntsville, Walker County, Texas, on May 27, 1947.

Measurements of the adult female are: total length, 475.0 mm; tail length, 61.0 mm; head length, 26.0 mm; head width, 20.0 mm. Scale counts: supralabials 8/7; infralabials 9/10; scale rows 24-23-19; ventrals 145; subcaudals 40. The left parietal is divided into three distinct parts, the one bearing the parietal spot being the smallest. Other than this the head scutulation is normal.

It is in respect to the color pattern that this specimen exhibits variation. In general the color is little darker than that of juveniles. The background is a light grey-tan and the transverse bands a light brown, not the reddish brown characteristic of copperheads. Only as a thin line on the medial borders of the markings, and the tip of the tail is the rich brown to be seen.

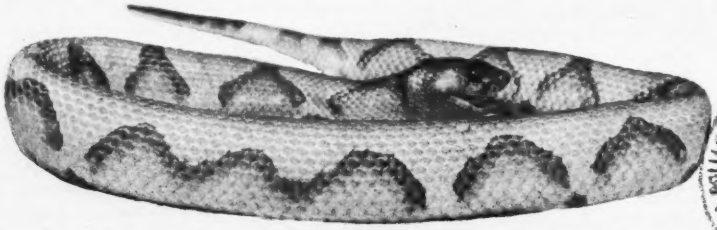

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Fig. 1. Aberrant *Agkistrodon mokeson austrinus* from Walker County, Texas

Most striking is the incompleteness of the transverse bands. Of the 17 bands present, 11 fail to meet at the middorsal line. Where the separated bands do reach the midline the left is anterior to the right and neither reaches beyond the keel of the mid-dorsal scale. Markings six, seven and eight on the left side are conjoined (fig.1) to form a continuous undulatory band 2 to 2½ scales wide; all other transverse blotches are separate from one another. The range of separation of the incomplete bands is from one scale length to seven and one half scale widths.

The lateral blotches of the ventral plates are on the average narrower than in normal specimens and never extend up the side more than ½ scale row. Under the conjoined bands (6, 7 and 8) of the left side the blotches are almost lacking.

Sam Houston State College, Huntsville, Texas

LATERAL RED SPOTS OF *TRITURUS V. VIRIDESCENS*

By William A. Hilton

Lateral bright red spots usually circled with black are characteristic of both the immature land forms and aquatic adults of this species. In *T. v. dorsalis* these spots are represented by elongated red lines or patches. In *T. v. louisianensis* the red spots are lacking or greatly reduced. *T. meridionalis* has no red spots and *T. perstriatus* has dorsolateral red stripes not especially black-bordered. All the European species of the genus that I have examined have no signs of these markings.

About 50 years ago on a walking trip in Pike Co., Penna., it rained most of the time and hundreds of the land form of *Triturus v. v.* were encountered. The most usual position for the red spots was along the sides of the body on a line from the eye and between the front and hind legs, but sometimes they extended beyond the front leg to the shoulder, neck or head. There were very seldom any on the tail. It was also quite unusual to have the spots out of line, but more were above than below the region of the lateral line. Very frequently the intervals between spots differed even in the fewer cases when there were exactly the same number on each side.

In a series of 72 specimens from Pike Co. the spots differed from two to 13 on a side. Certain combinations were more frequent than others. Those with exactly the same number on each side were found 21 times out of 72, with 2 to 6 spots on each side. The greatest number of these had 5 on a side, with 8 specimens. Those that had one less on one side numbered 27 out of 72, making 48 out of 72 that were nearly symmetrical as to numbers on each side. The other 14 were as follows: 5 lacked two, 7 lacked 3, one lacked 5 and one lacked 7 of being numerically symmetrical on the two sides.

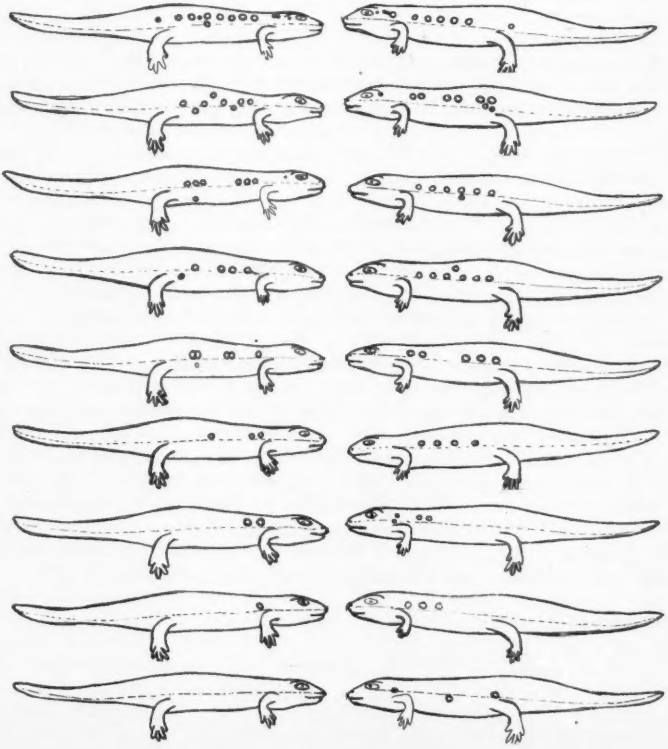
In position as well as in numbers there were many differences. Only 10 of 72 salamanders were found spotted on the neck region, but 39 were spotted on the head, 20 of these on the right side alone and 5 on the left alone while 9 had a single spot on both left and right sides. The salamander with the largest total number of spots had two on the left and three on the right side of the head.

Three sets of salamanders from three widely separated areas in Pike Co., Penna. were studied. The average number of spots on a side in each of the three areas was: 4.725, 4.946 and 5.

A series of 55 immature salamanders were examined from Ithaca, N. Y. but not all from one small area. Quite a marked difference was noted in these as compared with the Pike Co. groups. In the Ithaca salamanders the average number of spots on a side was much smaller, 3.5, and the average for each salamander was only 7.1. This low average was due in part to the fact that two salamanders were entirely without spots and the fact that there were a number with but one or two spots on a side. The smallest number on a side was 0. The usual number was from 3 to 5. As to the difference between the two sides, 18 had the same number of

spots on a side and 24 had one more on one side than the other.

Any information in respect to the continuation of the same spots throughout the life history was not obtained. What little evidence I have seems to indicate that the spots do not change in position of number during the life of the animals. The pigment seems to be in the deeper layers and the position of the spots seems not to be affected by moulting. Neither do I have any clear evidence that spots are passed along in like manner from generation to generation. Just how much the special arrangement of the spots is characteristic of certain races I have no means of telling as yet. Some attempt to detect certain races in spot patterns by means of the study of all possible from one area as compared with another similar but distant region gave no clear evidence; However it seems to me there is some slight indication of local differences. The last evidence of this kind was found when all the salamanders I examined in a region in southern New York had no spots.



Conclusions

1. There is a very great variation in the number and positions of the red spots of this species.

2. The variation is so great that it is seldom that two salamanders are alike..

3. In spite of the great variation, 4 to 6 spots are the usual numbers on the sides, with 9 to 10 for the whole animal.

4. Spots on the head are variable in occurrence and position and usually quite small.

5. Although there is a great variation in the number of spots on a side, there are usually as many spots on one side as the other or nearly the same number, very seldom is the difference between the two sides greater than two.

6. So far as could be determined, the spots are of no particular value to the salamanders for protection or sexual selection.

7. As far as the spots are concerned there may be local races of salamanders with local differences but so far as this study has gone it was not very evident.

8. In general immature and adult are similar as to the lateral red spots. It is quite possible that the land forms pass on their spot patterns to the adult, but no study was made to canfirm this possibility.

Pomona College, Claremont, Calif.

* * *

AN ECTOPIC EGG IN COLUBER—Extra-uterine embryos in snakes have been reported by Neill (Copeia, 1948, no. 2, p. 139) for *Natrix* and *Thamnophis,* and Neill *(in litt.)* tells me they have been observed in other live-bearing reptiles. Since this condition has apparently not been reported for egg-laying species, the following incident, although not strictly one of extra-uterine gestation, may be worthy of record.

On about July 15, 1944 I collected an average-sized adult of the black racer, *Coluber c. constrictor,* on the outskirts of New Albany, Indiana. The snake was lethargic and quite emaciated; yet the skin and mouth appeared healthy. An ovoid mass, immovable and firm to touch, was noted just anterior to the vent. I sacrificed the snake expecting to find a malignant tumor of the lower reproductive tract or rectum. Upon opening the abdomen, the mass was found to be a normal-sized egg situated in the extreme posterior end of the body cavity outside the oviducts and ventral to the digestive tract. It was lightly bound down by adhesions; however I unfortunately made no detailed notes of its relation to surrounding structures. The egg had the characteristic salt-grain shell membrane and contained a putty-like material in which no trace of an embryo could be found. The oviducts were empty. This egg almost certainly developed normally within the oviduct and was extruded from the upper end as suggested by Neill; otherwise it is difficult to explain the presence of a normal shell membrane. I question whether the ectopic egg was responsible for the debilitated condition of the reptile; although no other gross abnormalities were noted. The stomach contained a few ascarids, but this is not unusual.

Sherman A Minton, Jr., Indianapolis, Indiana

FORMS OF *OPHISAURUS* IN THE SOUTHEASTERN UNITED STATES

By Wilfred T. Neill

In a previous article I revived the name *Ophisaurus ventralis compressus* Cope for the "glass-snakes" of the islands off the Georgia and South Carolina coast (Neill, 1948, Herpetologica 4: 154). Recently, four other examples of the insular form have been secured, raising to eighteen the number of individuals examined. The newly acquired specimens were taken on small islands in Doboy Sound, McIntosh County, Georgia. The eighteen specimens form a consistent series; and accordingly it seems desirable to amplify the original description (Cope, 1900, Ann. Rept. U. S. Nat. Mus. 1898: 501) and my redescription.

The following diagnosis of *Ophisaurus v. ventralis* is based on 103 specimens from the Coastal Plain of Georgia and South Carolina. The terminology of the head shields is that of Smith (1946, Handbook of Lizards: 467).

Diagnosis--*O. v. ventralis*: Rostral semicircular; postinternasals in contact; one frontonasal, in contact anteriorly with the postinternasals and posteriorly with the frontal and prefrontals; prefrontals separated by the posterior extension of the frontonasal; frontal broad, its greatest width contained 1.3 to 1.9 times in its greatest length. Supralabials usually 10, separated from the eye by suboculars and lorilabials; loreals in 3 rows. Dorsal scale rows 16, scales of the tail about as broad as long. Head relatively short and broad, head length contained more than 7 times in body length; head width 1.4 to 2.0 times in head length. Lower jaw nearly as long as upper, not "countersunk". Snout broad, straight, bluntly rounded. Body broad, flat-backed; body width often exceeding body height. Tail, when complete and unregenerated, comprising not more than 70% of total length. Eye small, its horizontal diameter contained 41 to 54 times in body length. Juveniles brownish above; a blackish lateral stripe present, about 2 scale rows wide; a vertebral stripe present or absent, seldom sharply defined; 4 or 5 whitish upright bars, bordered by black spots, on head and neck. Adults brownish with a broad, blackish lateral band covering about 3 or 4 scale rows, the band composed of separate spots, one on each scale. Between these spots, 2 or 3 rows of greenish or bluish spots forming longitudinal light lines. Head and anterior third of body with upright bluish or greenish bars that may cross the midline. Most of the dorsal scales with dark spots forming longitudinal lines. Dorsal color extending on to the lateral fold for a distance of 2 or 3 scale rows. Venter immaculate.

O. v. compressus: Rostral arched, higher than broad; postinternasals separated by the anterior frontonasal; two frontonasals, one anterior to the other; anterior frontonasal in contact anteriorly with the postrostral and posteriorly with the posterior frontonasal; posterior frontonasal somewhat elongate, not in contact with the frontal posteriorly, or just barely so; prefrontals in contact, barely to broadly so; frontal narrow, width 1.5 to 2.3 in length. Supralabials 9 to 12, often

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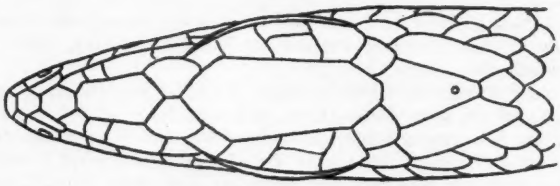
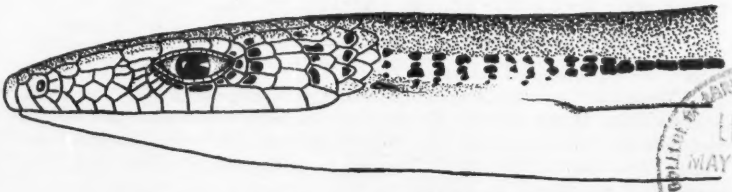
fusing; 2 supralabials in contact with the eye (the subocular labials are the sixth and seventh in the type; in my specimens they are normally the eighth and ninth, although when two anterior labials fuse, the subocular ones become the seventh and eighth); suboculars and lorilabials absent; loreals in 2 rows. Dorsal scale rows 14; scales of the tail often longer than broad. Head long and narrow; head length contained less than 7 times in body length; head width 2.4 to 2.7 times in head length Lower jaw considerably shorter than upper, and somewhat "countersunk". Snout long, narrow, and straight. Body narrow, cylindrical (but not "narrow roof-shaped" as Cope states). Tail, when complete and unregenerated, comprising 73% or more of total length. Eye large, its horizontal diameter contained 28 to 31 times in body length. Juveniles light bronze above; a sharply defined black lateral line less than one scale row wide, beginning just behind the head and extending the length of the body, becoming indistinct on the distal half of the tail. A faint but sharp-edged brownish vertebral line involving two half-rows of scales along the midline. Adults similar, but with the lateral line breaking up anteriorly into vertical black bars with bluish-white interspaces. Venter and lateral fold immaculate straw color.

INTERGRADATION—Intergrades between *ventralis* and *compressus* would be expected along the South Carolina coast; and two specimens are now at hand that are intermediate between the mainland and insular forms. They were collected near the beach at Charleston, Charleston County, South Carolina, by Mr. Francis L. Rose, who has generously deposited them in my collection. One example resembles *ventralis* in the following features: postinternasals in contact; frontonasal one; supralabials 10; suboculars and lorilabials present; dorsal scale rows 16; caudal scales not elongated; head length 7.3 in body length; head and neck with upright bluish bars, black-bordered. It resembles *compressus* in the following characters; frontonasal not in contact with the frontal; prefrontals narrowly in contact; loreals in 2 rows; dorsum bronze, the area between the lateral stripes unmarked; lateral stripe extending nearly to head before breaking up into spots. Certain of its characters are intermediate: frontal width 1.5 in frontal length; body slightly flattened; lateral black line sharply defined but about 2 scale rows wide; dorsal color faintly tinging upper border of lateral fold. The second specimen is essentially similar, with the following exceptions: suboculars lacking; lorilabials reduced; one of the postinternasals enlarged, filling in the space occupied by the anterior frontonasal in *compressus;* lateral stripe nearly 3 scale rows wide.

The occurrence of *compressus* on various scattered islands at first seems peculiar; but it should be noted that these islands have been formed quite recently by submergence of the coast, a process which is still taking place (Veatch and Stephenson, 1911, Geology of the Coastal Plain of Georgia: 37 *et seq.*). It may be that *compressus* is a remnant of an early form of *Ophisaurus* that has maintained itself on the remoter islands, but that has been partly or completely absorbed by *ventralis* on the mainland and nearby islands. An analogous case is the intergradation of *Natrix s. sipedon* with *N. s. insularum* on the islands of



1. *O. v. compressus*. McIntosh Co., Ga. Scalation of head, dorsal view.



2. *O. v. compressus*. McIntosh Co., Ga. Scalation of head and detail of pattern, lateral view (scales of body and gular region omitted).

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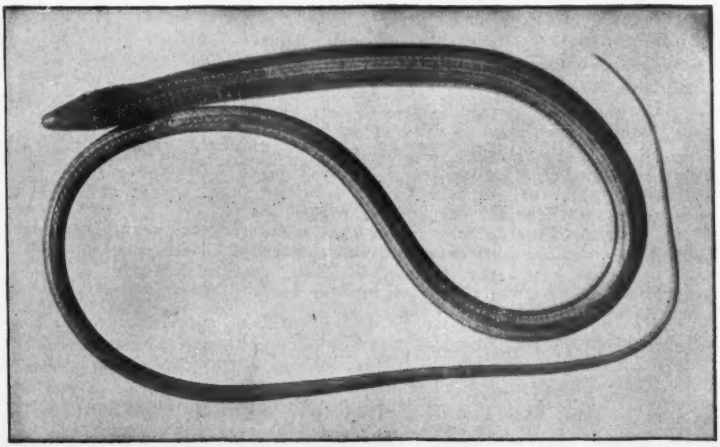

3. *O. v. compressus*. McIntosh Co., Ga. Adult male, showing characteristic attenuation.

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Lake Erie, although *compressus* is more sharply differentiated from *ventralis* than is *insularum* from *sipedon* (cf. Conant and Clay, 1937, Occ. Pap. Mus. Zool. Univ. Mich. 346: 1).

Mr. E. Ross Allen, of Silver Springs, Florida, has recently called my attention to the occurrence of two mainland forms of *Ophisaurus* in his state, and has generously presented me with series of both. One of these is similar to *O. v. ventralis* from Georgia and South Carolina; the other is distinct from both *ventralis* and *compressus*. Only 7 specimens of the aberrant form are at hand, 5 being from Florida, 1 from Georgia, and 1 from Alabama. In these, the rostral is arched, rather large and cap-like. The postinternasals are in contact, and but one frontonasal is present. The prefrontals are barely in contact. The frontal is long and narrow. The supralabials number 10, separated from the eye by suboculars and lorilabials; the loreals are in 3 rows. The dorsal scale rows number 14. The scales of the tail are about as wide as long. The head is long and narrow, but not as much so as in *compressus*. The lower jaw is shorter than the upper and somewhat "countersunk"; *i. e.*, somewhat overhung laterally and anteriorly by the upper jaw. The snout is long and slightly decurved, presenting a more rounded profile than in *ventralis*. The body is slightly flattened. The tail, complete and unregenerated in a single specimen, is proportionately no longer than that of *ventralis*. The eye is large, as in *compressus*. The pattern of the dorsum is similar to that of *compressus*, except for the presence of a well-defined vertebral stripe or row of spots. In adults, the posterior portion of the abdomen and the under surface of the tail are lined with brown, most examples displaying a line down the middle of every longitudinal row of scales on the under surface. A lined venter is not present in either subspecies of *ventralis*, although the ventrolateral portion of body and tail may become lined in old adults of typical *ventralis*.

NOMENCLATURE—The type locality of Linnaeus' *Anguis ventralis* was "Carolina," according to the fifth edition of the Checklist (p. 96). The type material was sent to Linnaeus by Dr. Alexander Garden, and the type locality may thus be restricted to the vicinity of Charleston, where Dr. Garden collected. The Charleston region seems to be inhabited by an intergradient population of "glass-snakes". Obviously it is desirable to restrict the name to the mainland form, and to employ the name *compressus* Cope for the insular subspecies.

The aberrant Florida form enters that state from the west, its range overlapping that of *ventralis* with no evidence of intergradation. Smith has figured what is almost surely the same form from Oklahoma (*op. cit.*: pl. 133c); and Cope has described similar material from Texas (*op. cit.*: 499). Scattered literature references indicate that the form is widespread in the Mississippi Valley. Apparently this is the animal called *attenuatus* by Cope, who attributed the name to Baird (*op. cit.*: 497). Cope rather easily convinced himself of the invalidity of this form, but adduced no real reason for discarding it. Boulenger recognized it as a valid form, specifically distinct from *ventralis* (1885, Cat. Liz. Brit. Mus., 2nd ed., II: 282); and available material suggests that Boulenger's allocation was correct.

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